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EXAMINER	
SAVANI, AVINASH A	
ART UNIT	PAPER NUMBER
3749	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/568,119	PRADE, BERND	
	Examiner	Art Unit	
	AVINASH SAVANI	3749	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 April 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. The following action is in response to the applicant's Amendment dated 4/12/2010, that was in response to the Office action dated 1/11/2010. Claims 16-35 are pending, claims 16, 24, 26 and 34 have been amended, while claims 17-23, 25, 27-33 and 35 are presented as previously claimed.

Response to Arguments

2. Applicant's arguments filed 4/12/2010 have been fully considered but they are not persuasive. The reason for the applicant's remarks not being persuasive are given below.

3. The applicant respectfully submits Hung/Pfefferle teaches a device that uses a swirler to impart swirl, and it appears that no primary burner downstream of the pre-reaction is present in the art. The examiner respectfully disagrees. A preburner (26) is present that provides heat for the catalytic reaction, and a combustor (30) is also provided before the main burner (25). Therefore, Hung does teach the use of the reacting fuel in a catalytic pre-reaction in (26), directing the pre-reacted fuel to combustor (30) and then further burning the fuel in (25). The pre-burner is at least a catalytic burner in that it provides heat for the process. Pfefferle does teach the use of a swirler to impart the swirl as claimed, however, the claim does not exclude the use of a swirler or does not offer how the swirl is imparted, therefore it is believed the Pfefferle does provide suitable evidence and reason to modify the device of Hung to obtain the

invention as claimed. For these reasons, the applicant's remarks are not persuasive, and the previous ground of rejection will be maintained.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 16-27, and 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Hung et al [6339925], further in view of Pfefferle et al [6048194].

4. With respect to claim 16, Hung discloses a method of combusting a dual gas/liquid fuel in a catalytic combustion system, comprising: providing a catalytic burner (20, 26) in a combustion air flow, wherein the catalytic burner comprises a dual gas or liquid fluid fuel supply, and the fuel supply is positioned upstream of a fuel outlet of a primary burner with respect to the direction of the combustion air flow [see FIG 1, col 3, line 5-14]; reacting fuel suppled by the catalytic burner fuel supply in a catalytic pre-

reaction by exposing the fuel and the air flow to the catalytic burner [col 3, line 14-19]; and continuing to burn the pre-reacted fuel in a secondary reaction located in the primary burner located downstream of the pre-reaction [col 3, line 20-24], however does not disclose the swirling component as further claimed. Pfefferle teaches a similar device wherein a fuel/air mixture is directed through a swirler (50) having a catalytic component (70, 80) which then allows for the directing the pre-reacted fuel and air flow via a swirling component into a flow channel at an angle of 15° to 75° relative to the direction of combustion air flow, wherein the angle is effective to impart a swirl to the pre-reacted fuel in the flow channel [see FIG 2, col 3, line 46-53, line 59-67, col 4, line 1-10, line 44-65]. In view of Pfefferle, a swirler directs pre-reacted fuel at an angle inherently in the range claimed based on the formulation of the swirl number and tangential velocities. It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide a swirling component because the technique was known in the art, yielding the predictable result of lowering NOx emissions by lowering burner temperature.

5. With respect to claim 17, Hung discloses the method as claimed in claim 16, wherein the pre-reacted fuel flow is directed into a combustion space [col 3, line 25-33, line 43-53], however does not disclose the creation of the vortex. Pfefferle teaches a similar device where a vortex is created, and the secondary reaction occurs in the vortex [see FIG 2, col 3, line 46-53, line 59-67, col 4, line 1-10, line 44-65]. In view of Pfefferle, the secondary reaction occurs in the vortex. It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide a swirling

component because the technique was known in the art, yielding the predictable result of lowering NOx emissions by lowering burner temperature.

6. With respect to claim 18, Hung discloses the method as claimed in claim 17, however does not disclose the length of the burner depending on the dwell time of the pre-reacted fuel. Pfefferle teaches a similar device wherein the combined length of the catalytic burner, primary burner and combustion space are determined based on a dwell time of the pre-reacted fuel [col 1, line 35-40]. In view of Pfefferle, the identification of the problem of a short channel limiting catalyst residence time shows the awareness of having the length of the burner depend on the dwell time. It would have been obvious to a person of ordinary skill in the art at the time of the invention to have the combined length of the device based on the dwell time of the pre-reacted fuel because it was known that the length of has an effect on the residence time of the catalyst reaction, therein showing that varying the length varies the catalyst reaction.

7. With respect to claim 19, Hung discloses the method as claimed in claim 18, wherein the catalytic burner (20, 25), primary burner (19) and combustion space (13) are arranged next to each other in sequence along a path of the air flow [see FIG 1].

8. With respect to claim 20, Hung discloses the method as claimed in claim 19, however does not disclose the secondary reaction as further claimed. Pfefferle teaches a similar method wherein the secondary reaction is a homogeneous non-catalytic reaction [see abstract]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to have a secondary reaction as claimed because the technique was known in the art, yielding the predictable result of limiting NOx formation.

9. With respect to claim 21, Hung discloses the method as claimed in claim 20, wherein the fuel is completely burned in the secondary reaction [col 3, line 54-61].

10. With respect to claim 22, Hung discloses the method as claimed in claim 21, wherein the dual gas/liquid fuel is either a fuel gas or a fuel oil [see FIGs 3A, 3B, col 4, line 33-54]. The use of methane suggests a fuel gas.

11. With respect to claim 23, Hung discloses the method as claimed in claim 22, wherein the fuel is a fuel gas during a first operating mode of the catalytic combustion system [col 3, line 54-61], however does not disclose the second operation mode as claimed. This, however is believed to be well known in the art to have different operation modes that with respective fuels, therefore it would have been obvious to a person of ordinary skill the art to have a second operating mode wherein a fuel is a fuel oil during a second operating mode catalytic combustion system because this feature offers versatility which is a common goal through innovation.

12. With respect to claim 24, Hung discloses a bumer (10) for burning a dual gas/liquid fuel, comprising: a primary burner (14, 19) comprising a primary channel, wherein the primary flow channel comprises a primary flow channel outlet [see FIG 1]; and a catalytic burner (20, 26) located within a combustion air flow channel, having a catalytically effective element (25), wherein a fuel outlet of the catalytic burner is positioned upstream of the fuel outlet of the primary burner with respect to the direction of flow of the fuel within the flow channel and the fuel is catalytically reacted via exposure to the catalytically effective element [see FIG 1, col 3, line 5-24], however does not disclose a burner creating a vortex. Pfefferle teaches a similar device having a

catalytically effective element (50) arranged to direct pre-reacted fuel into the primary flow channel via a catalytic burner fuel outlet at an angle between 15° to 75° relative to a direction of flow of combustion air in the primary flow channel to create a vortex in the primary flow channel [see FIG 2, col 3, line 46-53, line 59-67, col 4, line 1-10, line 44-65]. In view of Pfefferle, a swirler directs pre-reacted fuel at an angle inherently in the range claimed based on the formulation of the swirl number and tangential velocities. It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide a swirling component because the technique was known in the art, yielding the predictable result of lowering NOx emissions by lowering burner temperature.

13. With respect to claim 25, Hung discloses the burner as claimed in claim 24, wherein the fuel is a fuel gas during a first operating mode of the catalytic burner [col 3, line 54-61] however does not disclose the second operation mode as claimed. This, however is believed to be well known in the art to have different operation modes that with respective fuels, therefore it would have been obvious to a person of ordinary skill the art to have a second operating mode wherein a fuel is a fuel oil during a second operating mode catalytic combustion system because this feature offers versatility which is a common goal through innovation.

14. With respect to claim 26, Hung discloses the burner as claimed in claim 25, wherein the catalytic burner comprises a plurality of flow channels, a catalytic burner fuel output for each flow channel, and at least one catalytically effective element per catalytic burner output [see FIG 4, col 5, line 21-54].

15. With respect to claim 27, Hung discloses the burner as claimed in claim 26, wherein the catalytically effective element is a honeycomb catalytic converter [see FIG 5].

16. With respect to claim 34, Hung discloses a combustion chamber for a dual gas/liquid fuel gas turbine engine, comprising: a combustion chamber housing having an inward side and an outward side; a combustion chamber wall (12) formed on the inward side of the combustion chamber; a plurality of heat resistant elements affixed to an interior of the combustion chamber wall that define a combustion air flow channel (24) [see FIG 1]; a primary burner (14, 19) having a primary burner having a first annular flow channel comprising a first annular outlet and a second annular flow channel concentric with and surrounded by the first annular flow channel and comprising a second annular outlet; and a first catalytic burner located within a combustion air flow channel having catalytically effective element (25) and a first fuel outlet in fluid communication with the first annular flow channel, and wherein a fuel outlet of the catalytic burner (20, 26) is positioned upstream of the primary burner fuel outlet with respect to the direction of flow of a fuel within the flow channel and the fuel is catalytically pre-reacted by exposure to the catalytically effective element and subsequently a homogeneous non-catalytic secondary reaction is ignited downstream of the primary burner fuel outlet [see abstract, FIG 1, col 3, line 5-24], however does not disclose the inclination of the catalytically effective elements. Pfefferel teaches a similar device wherein the catalytically effective elements are inclined at an angle between 15° and 75° relative to a direction of a combustion air flow and effective to create a vortex in

the first annular flow channel [see FIG 2, col 3, line 46-53, line 59-67, col 4, line 1-10, line 44-65]. In view of Pfefferle, a swirler directs pre-reacted fuel at an angle inherently in the range claimed based on the formulation of the swirl number and tangential velocities. It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide a swirling component because the technique was known in the art, yielding the predictable result of lowering NOx emissions by lowering burner temperature. Although a second catalytic burner as claimed is not shown, it is believed that this is a matter of optimization/duplication of parts, and a person of ordinary skill in the art at the time of the invention would have found it obvious to provide a second catalytic burner because it would be within their knowledge to optimize performance by adding more parts, yielding the predictable result of destroying more pollutants with the use of more catalytic burners.

17. With respect to claim 35, Hung discloses the combustion chamber as claimed in claim 34, wherein the fuel is either a fuel gas or a fuel oil [see FIGs 3A, 3B, col 4, line 33-54]. The use of methane suggests a fuel gas.

18. Claims 28-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hung ['925], in view of Pfefferle et al ['194], further in view of McCarty et al [6015285].

19. With respect to claim 28, Hung discloses the burner as claimed in claim 27, wherein there is a honeycomb catalytic converter, however does not disclose the components as claimed.

20. With respect to claim 29, Hung discloses the burner as claimed in claim 28, wherein there is a honeycomb catalytic converter, however does not disclose the components as further claimed.

21. With regard to claims 28 and 29, Hung disclose the burner as claimed, however McCarty teaches a similar device wherein the honeycomb catalytic converter basic component is selected from the group consisting of titanium dioxide, silicon oxide and zirconium oxide [col 7, line 66-67, col 8, line 32-40] and wherein the honeycomb catalytic converter catalytically active component is a noble metal or metal oxide which has an oxidizing effect on the fluid fuel [see table 2]. In view of McCarty, the honeycomb structure acts as a catalyst which inherently would have an oxidizing effect on the fluid fuels based on the components of the honeycomb. It would have been obvious to a person of ordinary skill in the art at the time of the invention to have the honeycomb components as claimed because the option was known in the art, yielding the predictable result of having an oxidizing effect on the fuel so that there can be a reduction in NOx and CO emissions.

22. With respect to claim 30, Hung discloses the burner as claimed in claim 29, however does not disclose the vortex creation as further claimed.

23. With respect to claim 31, Hung discloses the burner as claimed in claim 30, however does not disclose the perpendicular arrangement of the catalytically effective elements as further claimed.

24. With regard to claims 30 and 31, Hung discloses the burner as claimed, however Pfefferle teaches a similar device wherein the vortex created by the catalytically

effective elements is located downstream of the primary burner fuel outlet [see FIG 2, col 3, line 46-53, line 59-67, col 4, line 1-10, line 44-65] and wherein the catalytically effective elements are arranged in a plane perpendicular to the direction of flow, and the fuel outlet of the catalytically effective elements discharges into the flow channel [see FIG 2, col 3, line 46-53, line 59-67, col 4, line 1-10, line 44-65]. In view of Pfefferle, a vortex is created and the fuel is discharged into the flow channel as claimed. It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide a vortex component because the technique was known in the art, yielding the predictable result of lowering NOx emissions by lowering burner temperature.

25. With respect to claim 32, Hung discloses the method as claimed in claim 31, however does not disclose the length of the burner depending on the dwell time of the pre-reacted fuel. Pfefferle teaches a similar device wherein the combined length of the catalytic burner, primary burner and combustion space are determined based on a dwell time of the pre-reacted fuel [col 1, line 35-40]. In view of Pfefferle, the identification of the problem of a short channel limiting catalyst residence time shows the awareness of having the length of the burner depend on the dwell time. It would have been obvious to a person of ordinary skill in the art at the time of the invention to have the combined length of the device based on the dwell time of the pre-reacted fuel because it was known that the length of has an effect on the residence time of the catalyst reaction, therein showing that varying the length varies the catalyst reaction.

26. With respect to claim 33, Hung discloses he burner as claimed in claim 32, wherein the catalytic burner (20, 25), primary burner (19) and flow channel are arranged next to each other in sequence along a path of the air flow [see FIG 1].

Conclusion

27. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AVINASH SAVANI whose telephone number is (571)270-3762. The examiner can normally be reached on Monday- Friday, alternate Fridays off, 7:30-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven McAllister can be reached on 571-272-6785. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Avinash Savani/
Examiner, Art Unit 3749

Steven McAllister
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6/30/2010

/Steven B. McAllister/

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